Many meat-eating mammals lack sweet tooth, study finds

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For all their sharp teeth, many meat-eating mammals lack a sweet tooth, a genetic analysis of a dozen species has shown.

The study, published this month in the journal Proceedings of the National Academy of Sciences, shows that carnivorous mammals whose diets don't feature much in the way of sugar may lose the ability to taste it at all.

Study co-author Gary Beauchamp, director of the Monell Chemical Senses Center in Philadelphia, wasn't sure what he was expecting to find when he and his colleagues began looking at DNA samples of a dozen different species to study their taste receptor genes. But he knew that cats are indifferent to sweet carbohydrates and lack a working copy of a key taste receptor gene called Tas1r2.

"At the time, the feeling was that the cat was a very unusual anomaly among mammals in that it didn't respond to sweets," Beauchamp said. "But we wondered if the cat represented something that had happened many times."

Using DNA samples mostly provided by the San Diego Zoo, the team from Monell and the University of Zurich examined taste receptor genes in a dozen different mammals and found that seven species - including sea lions, Asian otters and spotted hyenas - lacked a properly functioning Tas1r2 receptor. All seven were meat- or fish-eaters.

The precise mutation in the Tas1r2 gene varied from species to species - an indication that the loss of a sweet tooth wasn't something that occurred just once in the mammalian family tree, but happened independently at different points in time.

Sweet wasn't the only taste to disappear. Sea lions also appeared to lack functioning genes for detecting the savory tastes known to humans as umami. So did dolphins, which also lack working genes to detect different types of bitter substances. That was surprising to Beauchamp, he said, since bitterness is a useful warning of the presence of poison.

Altogether, the findings "illustrate the fact that the sensory world of animals is highly attuned to their dietary patterns," Beauchamp said.

The loss of major taste receptors in sea lions and dolphins makes sense given that these species often gulp their food without chewing, he added.

A similar pattern appears to hold for vegetarian mammals. Beauchamp pointed to research showing that bamboo-eating pandas have a well-developed palate for sweets, but they lack working umami receptors to detect savory, "meaty" foods.

Thomas Finger, a neurobiologist at the University of Colorado's Rocky Mountain Taste and Smell Center in Aurora, who was not involved in the research, said the study was "pretty impressive." Now he wonders whether the lack of working sweet genes is a sign that there's an evolutionary cost to maintaining an essentially useless taste receptor.

At the very least, he said, "it implies that as animals go to a more carnivorous diet, there's less and less advantage to it."

But Finger added one caveat. "They haven't tested the entire population" of these sweet-deprived species, he said. "If you looked in enough

individuals you might find someone with the gene."

As for those cat owners who insist their feline loves chocolate or goes crazy for ice cream, Finger shrugged at humans' tendency to anthropomorphize their pets' tastes.

"Ice cream has a strong umami taste to it, so that's why your cat likes ice cream," he said. "It's the milk protein. We're very sensitive to sweets - but the cat doesn't get it."